

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently amended) A disk storage apparatus comprising:
 - an actuator for positioning a head with respect to a disk;
 - a drive section for driving said actuator;
 - a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;
 - a position control section for producing position control information corresponding to the position error information by said position detection section;
 - a voltage detection section for detecting a voltage generated in driving said actuator and outputting a voltage signal;
 - a disturbance torque estimation section for estimating the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and a drive signal from said drive section, and producing disturbance estimation information;
 - a correction section for correcting the position control information by said position control section with the disturbance estimation information by said disturbance torque estimation section and producing said drive signal; and
 - a disturbance monitor section for monitoring the disturbance estimation information by said disturbance torque estimation section, and prohibiting a record by said head if said disturbance estimation information exceeds an allowable range.

2. (Currently amended) The disk storage apparatus as set forth in claim 1, wherein said disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

3. (Canceled)

4. (Currently amended) A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a position control section for producing position control information corresponding to the position error information by said position detection section;

a voltage detection section for detecting a voltage generated in driving said actuator and outputting a voltage signal;

a disturbance torque estimation section for estimating the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and the position control information by said position control section, and producing disturbance estimation information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said disturbance torque estimation section and producing said drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said disturbance torque estimation section, and prohibiting a record by said head if said disturbance estimation information exceeds an allowable range.

5. (Currently amended) The disk storage apparatus as set forth in claim [[3]] 4, wherein said disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the position control information from position control section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

6. (Canceled)

7. (Currently amended) A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a velocity/disturbance torque estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage

detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance estimation information;

a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance torque estimation section to said position error information according to predetermined conditions to produce position control information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance torque estimation section and producing said drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance torque estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section.

8. (Currently amended) The disk storage apparatus as set forth in claim 7, wherein said velocity/disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and

said second integration section produces said velocity estimation information therein.

9. (Canceled)

10. (Currently amended) A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for receiving position control information and driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding, to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a velocity/disturbance torque estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance estimation information;

a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance torque estimation section to said position error information according to predetermined conditions to produce position control information; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance torque estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section,

wherein said drive signal is obtained based on the position control information by said position control section.

11. (Currently amended) The disk storage apparatus as set forth in claim 10, wherein said velocity/disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section.

12. (Canceled)

13. (Currently amended) A disk storage apparatus comprising:
an actuator for positioning a head with respect to a disk;
a drive section for driving said actuator;
a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;
a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;
a velocity/disturbance torque estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from position control information by a position control section, and producing velocity estimation information and disturbance estimation information;
a position control section for producing position control information corresponding in principle to the position error information by said position detection section and adding the velocity estimation information by said velocity/disturbance torque estimation section to said position error information according to predetermined conditions to produce position control information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance torque estimation section and producing said drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance torque estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position error information in said position control section.

14. (Currently amended) The disk storage apparatus as set forth in claim 13, wherein said velocity/disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the position control information from said position control section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and said second integration section produces said velocity estimation information therein.

15. (Canceled)

16. (Currently amended) A disk storage apparatus comprising: an actuator for positioning a head with respect to a disk; a drive section for driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a position control section for producing position control information corresponding to the position error information by said position detection section;

a velocity/disturbance torque estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from a drive signal in said drive section, and producing velocity estimation information and disturbance estimation information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance torque estimation section and adding the velocity estimation information to said position control information by said velocity/disturbance torque estimation section according to predetermined conditions to produce said drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance torque estimation section and when said disturbance estimation information

exceeds an allowable range, making valid said velocity estimation information with respect to said position control information in said correction section.

17. (Currently amended) The disk storage apparatus as set forth in claim 16, wherein said velocity/disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the drive signal from said drive section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the added value of the output of said second multiplication section and the output of said first integration section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and said second integration section produces said velocity estimation information therein.

18. (Canceled)

19. (Currently amended) A disk storage apparatus comprising:

an actuator for positioning a head with respect to a disk;

a drive section for driving said actuator;

a voltage detection section for detecting a voltage generated in driving said actuator, and outputting a voltage signal;

a position detection section for producing position error information corresponding to the current position of said head from servo information which has been previously recorded on said disk and is detected by said head;

a position control section for producing position control information corresponding to the position error information by said position detection section;

a velocity/disturbance torque estimation section for estimating a head moving velocity and the magnitude of a disturbance exerted on said head from the voltage signal by said voltage detection section and from position control information by said position control section, and producing velocity estimation information and disturbance estimation information;

a correction section for correcting the position control information by said position control section with the disturbance estimation information by said velocity/disturbance torque estimation section and adding the velocity estimation information to said position control information by said velocity/disturbance torque estimation section according to predetermined conditions to produce said drive signal; and

a disturbance monitor section for monitoring the disturbance estimation information by said velocity/disturbance torque estimation section and when said disturbance estimation information exceeds an allowable range, making valid said velocity estimation information with respect to said position control information in said correction section.

20. (Currently amended) The disk storage apparatus as set forth in claim 19, wherein said velocity/disturbance torque estimation section includes:

a comparison section for receiving the voltage signal detected by said voltage detection section;

a first multiplication section for multiplying the position control signal from said position control section by a first coefficient;

a second multiplication section for multiplying the output of said comparison section by a second coefficient;

a first integration section for integrating the output of said comparison section; and

a second integration section for integrating a value obtained by subtracting the output of said second multiplication section from the output of said first multiplication section,

wherein said comparison section compares said voltage signal with the output of said second integration section, and outputs the result to said second multiplication section and said first integration section, and said second integration section produces said velocity estimation information therein.

21. (Canceled)